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A REMARKABLE NEW FAMILY OF SPINED POLYDESMOID DIPLOPODA, INCLUDING A SPECIES LACKING GONOPODS IN THE MALE SEX[1]

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Collecting in Alta Verapaz, Guatemala, during the course of agricultural investigations in 1904, the late O. F. Cook obtained specimens of two species of polydesmoid millipeds which in general appearance are quite unlike any species previously known from the western Hemisphere. Bearing a considerable resemblance to the strongylosomatid genus *Hylomus* of southeast Asia, these animals with curiously elevated and spined paranota appear to warrant the erection of a new family for their reception.

In publishing the names and descriptions of these millipeds, more than 50 years after their collection, we not only establish a new family, but more importantly, record one of the most astonishing and basic departures in the morphology of known Diplopoda. In one of the new species, there are no gonopods, segment 7 of males having instead two pairs of perfectly normal ambulatory legs. This condition is certainly unique insofar as helminthomorph diplopods are concerned, and one which might have been, *a priori*, considered impossible since gonopods are of the utmost importance in perpetuation of these animals. That it is normal for the species—and not a teratological situation—is attested by the great enlargement of the second pair of legs of males into clavate appendages which presumably substitute in some way for gonopods in the process of sperm transfer.

It is a curious circumstance that among all the millipeds discovered by Dr. Cook during his many years of collecting he should have failed to recognize what certainly was his

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most unusual species. Intent as always on preserving both sexes of the millipeds he collected, Dr. Cook probably mistook the gonopodless males to be females and so overlooked their significance. Otherwise, the unusual morphological and evolutionary aspects involved unquestionably would have fascinated him and led to the publication of these peculiarities.

We commence our discussion with formal diagnoses and descriptive notes of the new family and its included genera and species, following which some remarks upon the systematic position and evolutionary significance of the group are given.

TRIDONTOMIDAE, new family

Body composed of 20 segments in both sexes; exoskeleton rather thin, not well sclerotized.

Antennae and legs unusually long and slender.

Paranota of collum wide and much exceeding sides of head, greatly resembling those of following segments.

Prozonites of midbody segments well exposed, separated from metazonites by a broad, pronounced interzonal constriction. Metazonites with a broad middorsal concavity, but with no well defined transverse sulcus; paranota wide, moderately to greatly elevated, and produced into large acuminate, spine-like lobes; paranota of midbody segments occupy from two-thirds to five-sixths of the posterior sides of the metazonites. Ozopores very small, located in a rounded swelling on ventral side of the paranota of segments 5, 7, 9, 10, 12, 13, 15–19.

Males with or without gonopods. Coxae of second pair of legs each with a long, tubular seminal process, more or less setose at apex.

In the species with gonopods, these appendages of moderate size, the coxae completely independent from each other, and without trace of solenite. Telopodite consisting of a single article, without basal cavity or a seminal groove. Sternal aperture of segment 7 virtually divided by a long lobe from the posterior margin which nearly touches a smaller corresponding lobe from the anterior margin. In the species without gonopods the seventh segment has two pairs of normal legs, but the legs of the third segment are greatly enlarged and clavate.

Tridontomus, new genus

Type species: Tridontomus procerus, new species.

Diagnosis: Differing from *Aenigmopus* in the presence of gonopods in the male sex and by the normal configuration of the second pair of legs. The collum is distinctly broader and more acutely spiniform, and the caudal edge of each metazonite distinctly elevated. Other differences in body form are noted in the following paragraphs.

Description: Body of moderate size, the exoskeleton not strongly

sclerotized and segments and appendages are capable of being indented or bent without breaking.

Head with a deep vertigial sulcus; labrum long and thin; antennae very long and slender, longer in males than in females, with a sensory area at apex of 5th and 6th articles.

Paranota of collum greatly exceeding sides of head and quite similar in shape to those of following segments.

Prozonites of most body segments largely exposed, separated from metazonites by a strong interzonal constriction. Metazonites shallowly depressed middorsally, lacking a distinct transverse sulcus, but with two anteriorly placed setiferous tubercules and a row of four to six larger tubercules near the caudal margin. Paranota of anterior and posterior segments occupying full length of metazonites, but those of midbody segments restricted to posterior two-thirds of length in males and four-fifths in females. Paranota rather thin, very wide, moderately to strongly elevated and consisting of three prominent, acuminate, outwardly directed lobes of which the middle is longest, the posterior shortest; paranota of segment 18 with first and last lobes greatly reduced in size and on segment 19 these lobes are not represented, the middle lobe occurring as a strong lateral ridge which extends beyond the posterior margin of the segment. Ozopores small, opening in low rounded swellings on ventral side of paranota of the usual poriferous segments.

Anal segment narrowed apically and exceeding the paraprocts, its tip truncated and narrowly oval.

Segment 7 of males with the sternal aperture small, almost divided medially between the gonopods by a high, produced lobe of the posterior margin, which extends cephalad and almost contacts a similar but much smaller lobe of the anterior margin. Gonopods moderately large, parallel *in situ*, extending cephalad between the legs of the 6th segment. No trace of sternal vestige or other form of connection between the gonopods aside from the usual intercoxal muscle. Coxae small, merging proximally into small but curiously formed apodemes; no trace of solenite evident. Telopodite fairly long and slender, unsegmented, set against the coxa at a right angle, the prefemoral portion without any basal concavity or groove, and no seminal groove visible along the length of the telopodite. A slender apically twisted prefemoral process occurs on the dorsal side, and a long acuminate retorse projection of the distal third extends somewhat caudolaterad.

Legs in both sexes very long and slender, setose, extending laterally beyond edges of paranota by several distal joints; legs of males with the coxae and prefemora noticeably enlarged, the others only slightly stouter than those of females. Anterior legs of males not specially modified except for the elongated, tubular, and distally laciniate seminal process on the coxae of the second pair of legs.

In females, ventral surface of third segment broadly elevated into a

high cup-like or trough-like epigynal structure behind second pair of legs and hiding much of the basalmost joints.

Tridontomus procerus, new species

Figs. 1–13, 22

Type specimens: Male holotype, three female and six immature paratypes, U. S. Nat. Mus. Diplopod Type No. 2823, from Sepacuite, Dept. Alta Verapaz, GUATEMALA, collected in May, 1904, by O. F. Cook.

Diagnosis: With the characters of the genus; specific characters undoubtedly reside in the formation of the gonopods.

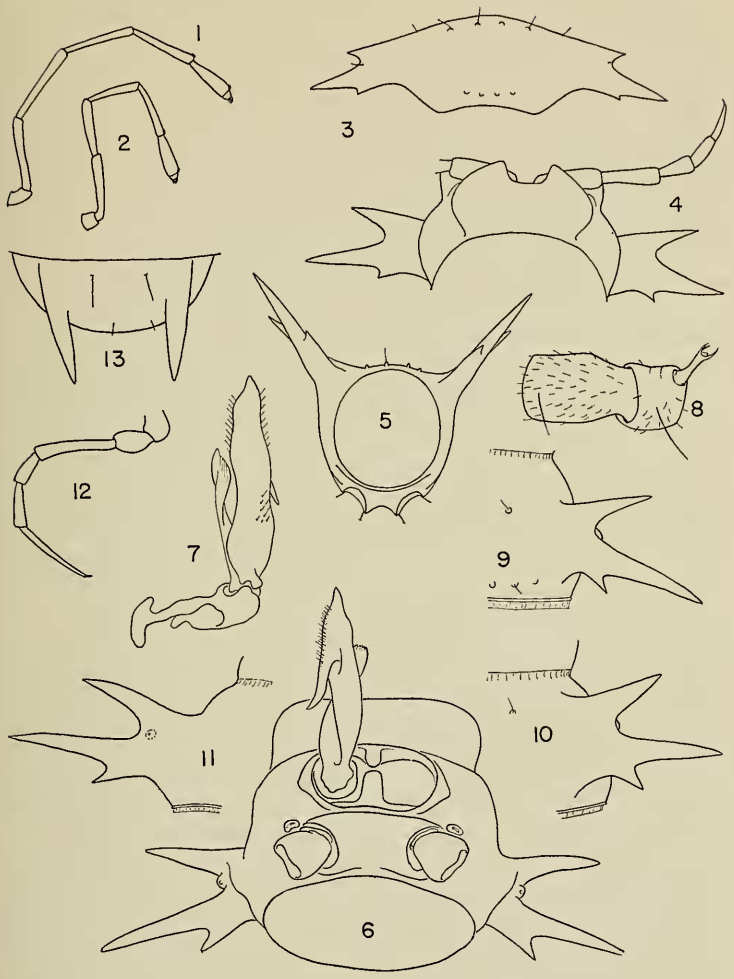
Description of holotype: Length, 33.0 mm, width across paranota, 6.0 mm. Color uniformly pale grayish, possibly faded from long preservation.

Head with deep median longitudinal sulcus on vertex, divided in front opposite top of antennal sockets and extending cephalolaterad on each side as a somewhat shallower, less definite depression to anterior margin of the socket; surface of vertex dull, with tiny scattered granules and a few short setae; a single long vertigial seta on each side of the sulcus. Front smooth and polished, but with numerous scattered setae of varying length. Labrum thin and projecting, crossed by a median series of 16 long setae, these stouter than those on the front, curving forward and ventrad half again their length beyond ventral edge of labrum. Antennae (Fig. 1) very long and slender, extending to caudal margin of segment 6 when appressed to body, articles 5 and 6 each with a tiny sensory area at the apex on outer side.

Collum of the form as shown in Fig. 3, its paranota greatly exceeding sides of head and slightly elevated, a short seta in the sinus between first and second lateral projection and another on front margin on each side near its junction with discal part of collum. A subtransverse series of four small setiferous tubercules just behind the anterior margin, and a similar row of smaller tubercules adjacent to the posterior margin. Central part of collum somewhat depressed, its surface, as well as that of the following metatergites, very finely and densely granular, the granules extending onto basal part of paranota but not onto their outer portions which are polished and faintly reticulated like the surface of the prozonites. Surface of metazonites most distinctly granular adjacent to posterior row of tubercules.

Body cavity higher than wide; prozonites considerably exposed, separated from metazonites by a broad, deep interzonal constriction, in which the transverse interzonal suture is represented by a slight declivity forming a distinct line. Metazonites with a raised rim along the posterior margin, this followed by a long, thin, unmodified supplementary border ("Franzensaum").

Metatergites posterior to the collum with two tiny, widely separated setiferous tubercules near the anterior margin; on segments 2 to 4 also four larger setiferous tubercules adjacent to the posterior margin, in-



Figs. 1–13. *Tridontomus procerus*, new species. 1.—Antenna of male. 2.—Antenna of female. 3.—Collum of male. 4.—Segment 2 of female, anterior aspect, showing epigynal development. 5.—Segment 4 of male, caudal aspect, to show degree of elevation of paranota. 6.—Segment 7 of holotype, ventral aspect, with the left gonopod removed, the right gonopod in situ. 7.—Left gonopod of holotype, mesial aspect. 8.—Coxa and prefemur of second leg of male, to show form of seminal process. 9.—Right half of segment 10 of male, dorsal aspect, the paranotum considerably foreshortened. 10.—Right half of segment 10 of female, dorsal aspect. 11.—Segment 10 of female, right paranotum in ventral aspect, showing full length, also location of ozopore. 12.—Leg from midbody segment of male. 13.—Segment 19 of male, dorsal aspect. (All figures to same scale except 6 and 7 which are slightly enlarged.)

creasing to six on segments 5 to 17. These tubercules form a transverse row, in which the inner four are narrowly conical, the median pair largest. Segments 18 and 19 without tubercules but apparently normally with setae in the corresponding positions (some are lost).

Tergites with a broad concave middorsal depression but without a distinct transverse sulcus. Beginning with segment 2 the paranota became more distinctly trilobed and are completely so formed back through segment 17; the first and third lobes greatly reduced on segment 18 and lacking from segment 19. Paranota abruptly elevated from segment 2, the maximum angle achieved at segment 4 (Fig. 5) and approximated again from segments 16 to 18, elevation of the intervening segments not so pronounced. Paranota of segments 2 to 5 as long as the metazonites, but for several succeeding segments they gradually occupy less of the sides of the metazonites until only the posterior two-thirds of the length is occupied by paranota (Fig. 9) and this condition extends to segment 17. On segment 18 the paranota occupy more of the metazonital length, and on segment 19 the entire side of the posterior subsegment is covered with the small narrow paranotum which is also produced beyond the posterior margin of the segment as a slender conic process (Fig. 13). Ozopores small, in normal sequence on segments 5, 7, 9, 10, 12, 13, 15–19, opening in a low rounded swelling on ventral side of paranota just mesad of the sinus between lobe 1 and 2 (Fig. 11), largest swelling on segment 18, but none on segment 19 where pore opens ventrad of the ridge-like paranotum near middle of metazonite.

Anal segment with an anterior row of eight setae, the outer two on each side occurring adjacent to caudal margin of the segment, a subapical row of four setae, and a terminal cluster of four setae. Epiproct elongate, narrowly oval, moderately exceeding paraprocts. Latter somewhat inflated, the margins broad, high, and distinctly polished in contrast to the dull surface elsewhere, each paraproct with two long, widely separated setae located near the elevated mesal margin. Hypoproct subtriangular, more than twice as wide as long, the apex broadly rounded, with two long paramedian marginal setae but no distinct tubercules.

First pair of legs small, scarcely exceeding ends of collum, second and ensuing pairs of legs very slender, rapidly increasing in length for several pairs to their considerable maximum length; the three distalmost podomeres extending laterally beyond the ends of the paranota. Coxae and prefemora somewhat thickened, each with a long seta near the apex on ventral side, otherwise glabrous but with a finely granular texture, remaining podomeres entirely smooth. Legs set on distinctly elevated podosterna which are impressed by a deep transverse depression and a less distinct longitudinal groove; surface of podosterna somewhat more distinctly granular than the coxae.

Segment 7 in ventral aspect as shown in Fig. 6. Gonopodal aperture nearly closed medially by an elevated projection of the posterior margin which nearly touches a similar but shorter lobe from the anterior margin.

Gonopods of the form shown in Figs. 6 and 7, and with the general structure as itemized in the generic diagnosis.

Seminal process of the second pair of legs long, slender, and tubular in appearance, its apex with 2 or 3 short setae (Fig. 8).

Description of paratypes: Females, of about the same length as the male, the width across paranota also approximate, but the body cylinder is wider, the cavity circular, the paranota farther apart dorsally but narrower and not so prominently elevated as in the male, reaching the maximum elevation on segment 17. Paranota of segment 18 simpler than in male, anterior and posterior spiniform lobes reduced to knobs or slight undulations on the median lobe.

Labrum thin as in the male but not as long; the antennae also shorter, extending caudally only to posterior margin of segment 4; segmental granulation more uniform in that the texture does not become rougher adjacent to the posterior row of tubercules; pore swellings not more conspicuous near caudal end of body; legs slightly more slender than in male, the basalmost podomeres not enlarged and lacking the granular texture.

Segment 3 with ventral surface behind the legs developed into a high, anteriorly open trough-like epigynal structure, deeply emarginate medially as seen in oral aspect (Fig. 4).

Aenigmopus, new genus

Type species: Aenigmopus alatus, new species.

Diagnosis: Very similar in general appearance to *Tridontomus* but differing from it and from all other helminthomorph Diplopoda by the complete lack of gonopods, segment 7 of males having two pairs of normal walking legs; second pair of legs of males strongly crassate, with unusually stout pretarsi.

Description: Body rather small and slender, about seven times as long as broad, very poorly sclerotized; prozonites considerably exposed, separated from metazonites by a wide deep constriction. Metazonites with transverse rows of setiferous tubercules as in *Tridontomus* but lacking granulation, middorsal surface distinctly depressed; posterior margin of segments without raised rim, supplementary margin short. Paranota resembling those of *Tridontomus,* occupying only part of sides of metazonites except on several terminal segments, shorter at base in males than in females.

Head deeply sulcate on vertex; labrum short, with anterior edge a little thickened; antennae long and slender, those of male slightly longer than of female, with a small sensory area at distal end of articles 5 and 6.

Collum much wider than head, its lateral ends slightly elevated, each end consisting of a single acute ectal projection with a small sharp dentation on both front and back margins.

Segment 2 with the paranota bilobed, a third small lobe occasionally present behind largest one; paranota of segments 3 to 17 with three strong spiniform lobes as in *Tridontomus* but generally narrower although

equally strongly elevated. Paranota of segment 18 not as large as preceding, consisting of a single, high acute lobe; those of segment 19 each reduced to a small lateral ridge extended beyond caudal margin of the segment as a short, acute point. Last segment in outline as in *Tridontomus,* but truncated apex circular rather than oval; paraprocts with thin, elevated margins; hypoproct triangular, its apex acute.

Males lacking gonopods; segment 7 with two pairs of legs no different from those on adjacent segments. Second pair of legs large, strongly crassate and uncate; each basal joint with a long tubular, apically setose seminal process; pretarsus of these legs unusually large and heavy. All other legs very long and slender, similar in the two sexes.

Females with ventral surface of segment 3 raised into a high, thin, epigynal crest behind the second pair of legs.

Aenigmopus alatus, new species
Figs. 14–21

Type specimens: Male holotype, two male and two female paratypes, U. S. Nat. Mus. Diplopod Type No. 2824, from Scamay, GUATEMALA, collected in June 1904, by O. F. Cook.

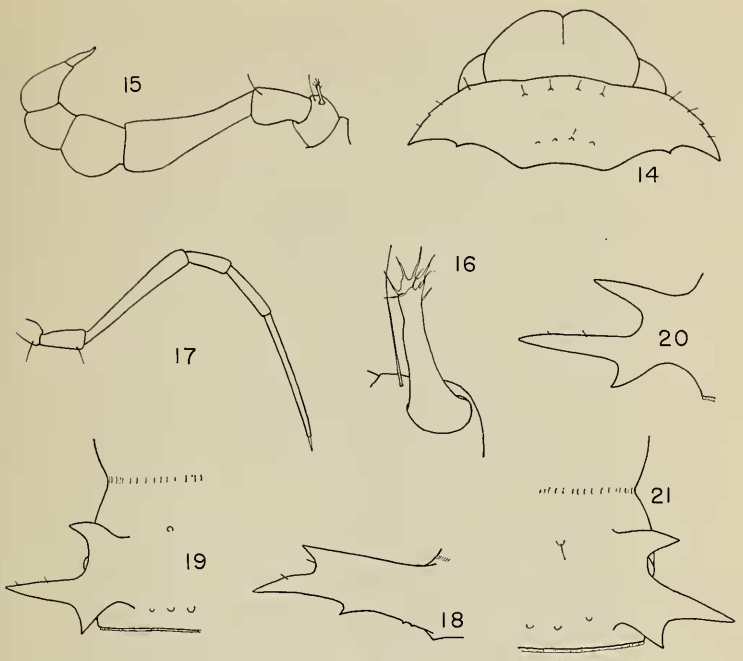
Diagnosis: With the characters of the genus.

Description of holotype: Adult male, length 22.0 mm, width across paranota, 3.0 mm. Color uniformly grayish.

Head with pronounced sulcus on vertex, deepest anteriorly, a broad shallow depression extending cephalolaterad on each side from lower end of vertigial sulcus to front margin of antennal socket; surface of vertex dull, reticulated, lacking granulations, sparsely beset with setae of moderate to considerable length; frons smooth and polished, the setae similar to those of vertex but more abundant. Labrum short, not especially thin as in *Tridontomus,* slightly depressed behind, with a transverse series of 16 to 20 setae, the tips of which do not much exceed labral margin; median setae of the series shortest. Antennae very long and slender, those of males capable of reaching caudal edge of segment 5 when appressed, those of females attaining caudal edge of segment 4. Articles 5 and 6 with a small sensory area near apex on the outer side.

Collum (Fig. 14) subcrescentic in outline, very broad, much exceeding sides of head, the lateral ends produced as a broadly acuminate lobe with a small sharp tooth on either margin near base; paranotal area of collum slightly elevated; dorsal surface and margins with setae as shown in the figure.

Prozonites and metazonites of body segments separated by a rather strong interzonal constriction, which, however, is not marked by a distinct suture line as in *Tridontomus.* Metazonites with an indefinite shallow middorsal depression, the dorsal surface dull, not granular but reticulated across dorsum and onto bases of paranota, latter distally smooth and polished. Anterior portion of metatergites with two widely separated, small setiferous tubercules; segments 2 to 4 (or 5) with four small setiferous tubercules in a row near the posterior margin, on more



Figs. 14–21. *Aenigmopus alatus,* new species. 14.—Collum and top of head of male. 15.—Right leg of second pair of male. 16.—Seminal process from coxa of second leg, enlarged. 17.—Leg from a midbody segment of male. 18.—Left paranotum of segment 2, male. 19.—Left paranotum of segment 9, dorsal aspect, the paranotum very foreshortened. 20.—Left paranotum of segment 9, perpendicular aspect to show full length and correct proportions. 21.—Right paranotum of segment 9, female, dorsal aspect.

posterior segments this number increases to six. Posterior margin of metazonites without a raised rim, the supplementary margin short. Paranota not fully occupying sides of metazonites except on one or two terminal segments, those of males occupying less of sides than those of females. Paranota of segment 2 (Fig. 18), with first and third marginal lobes small; on subsequent segments these lobes are larger (Figs. 19, 20) and are present through segment 17. Paranota of segment 18 smaller than on 17, each consisting of a simple, elevated, rather slender, caudally directed acute process; those of segment 19 small, each a low ridge terminating as a short conic projection which slightly exceeds caudal margin of the segment. All paranota elevated, the maximum angle attained at segments 4 and 5, but some caudal segments nearly as high, those of intervening segments less elevated.

Anal segment shaped as in *Tridontomus* but the truncated apex round; dorsal setae arranged as in that genus but the median four setae of the anterior row borne on distinct small tubercules; paraprocts slightly

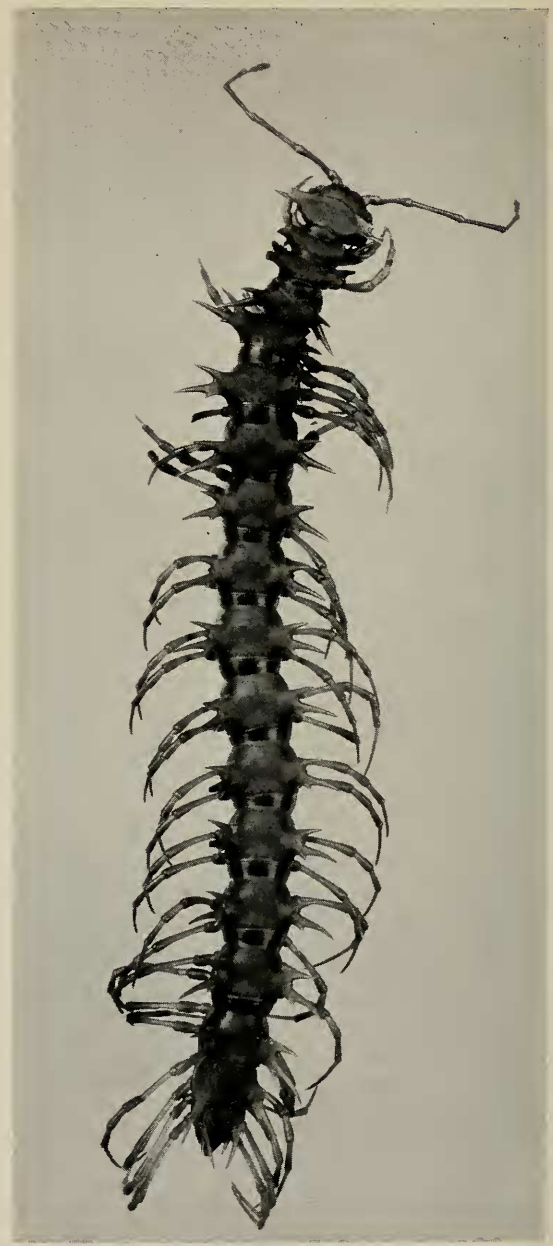


FIG. 22. *Tridontomus procerus,* male paratype, dorsal aspect.

inflated, the margins thin and high, with a pair of widely separated setae adjacent to each margin; hypoproct large, triangular, apically acute, with a long paramedian marginal seta on each side at the caudal fourth of the length.

Legs, except second pair of male, similar in both sexes; very long and slender (Fig. 17), exceeding outer limits of paranotal lobes by considerably more than their distal three podomeres. Podosterna moderately elevated, each with a broad, shallow longitudinal groove and a similar but deeper transverse groove; the surface of each podosternum thus with a cruciform impression.

Segment 7 with two pairs of normal walking legs. Second pair of legs large, crassate, and uncate in appearance (Fig. 15), podomeres smooth and polished; coxae with a long, tubular, apically setose seminal process (Fig. 16); pretarsus unusually large and heavy.

Description of paratype female: Largest female, 22 mm long and 3.2 mm in greatest width, essentially similar to male in most structural respects except that the paranota are narrower and the body cavity diameter relatively greater than in males. As in *Tridontomus procerus,* paranota occupy considerably more of the sides of the metazonites than in males.

Ventral surface of segment 3 elevated into a thin, high, rounded transverse crest behind the second pair of legs.

Systematic Position of the Tridontomidae

Among the ranks of known polydesmoid millipeds, there are only a few species which even superficially bear a resemblance to those which we have just described. These belong to the Asiatic genera *Hylomus, Centrodesmus,* and *Pratinus* of the family Strongylosomatidae. Indeed, if only females of the Tridontomidae were known, we would probably have considered them to be related to *Hylomus.*

The resemblance, however, is due entirely to independent and parallel development. The gonopod structure of *Tridontomus procerus* indicates that the genus is related to the large and extremely heterogeneous assemblage of diverse forms traditionally referred to the "family" Rhachodesmidae. No doubt when this group has been carefully studied it will be rendered into several natural and distinct family groups (which may require subordinal status), but it now seems that none of them will affect the status of the Tridontomidae, a family signalized by a whole galaxy of unusual characters. The gonopod of *T. procerus* is similar to the general rhachodesmoid type, and the curious modification of the gonopod aperture is repeated in the rhachodesmoid genus *Holistophallus* Silvestri.

Rhachodesmoids collectively are members of a group notable for great variability and the development of bizarre features. Among their ranks we find millipeds which are bright blue, green, orange, and even pure white as adults; here the gonopod structure ranges from the normal polydesmoid appearance down to monoarticular fused remnants.

Body form varies from a slender juliform shape to broad, flat, limaciform contour. Within the limits of this so-called single family occurs more variation than in all of the remaining polydesmoids.

The discovery of the Tridontomidae adds still another facet to the heterogeneity of this complex; a facet that we feel is extreme enough to warrant familial designation even before the entire group has been studied.

The occurrence of the tridontomid genera in Central America is, of course, additional presumptive evidence of relationship, since all other true rhachodesmoids are restricted to Middle America (such aberrant genera as *Atopogonus* of New Caledonia and *Telonychopus* of Brasil are probably not rhachodesmoids or even closely related to them).

The Evolutionary Significance of *Aenigmopus*

Aenigmopus alatus, as previously remarked, is one of the most unusual milliped species so far discovered, owing to its loss of gonopods and, presumably, the development of some other method of sperm transfer from male to female.

The class Diplopoda may be divided into three very distinct and more or less equivalent groups on the basis of over-all structural attributes. The smallest of these includes pselaphognath or polyxenoid species, very small and highly specialized animals which have no external genitalic structures and in which the exact details of insemination are unknown. The next largest group contains the glomeroid, glomeridesmoid, and zephronioid forms, the so-called "opisthandrous" millipeds. In these short and compact animals, many modified for rolling into a sphere, no gonopods are developed, and spermatophores are transferred to the external female genitalia by the mouth of the male. These two groups are quite small, and together comprise only a few hundred species.

Finally, in the great majority of diplopods—making up the third group, called Helminthomorpha by Pocock and Proterandria by Verhoeff—one or both pairs of legs of the 7th body segment in males are modified into characteristic and remarkable sperm transfer devices called gonopods. In the species of this group, males deposit seminal material (usually spermatophores) directly from the vasa deferentia upon one or both gonopods, and these are at some later time brought into close contact with the receptacular outer ends of the oviducts. The presence and preservation of functional gonopods have thus been considered an outstanding necessity for the continuity of helminthomorph species.

Various abnormal male sexual conditions are known, involving duplication of the 7th segment to form twice the usual number of gonopods; occasional incomplete genetic control (e.g., a gonopod on one side and a normal leg on the other); and even occasional failure of the gonopods to appear. Such conditions are unquestionably the result of homoeotic mutations, affecting individual animals and doubtless preventing their reproduction. It is obvious that any mutation involving loss or impairment of gonopods can be only disadvantageous unless some

other, associated mutation, produces an efficient alternative sperm transfer sequence.

Aenigmopus alatus represents an entirely new state of affairs. Here the loss of gonopods has been compensated by the development of a presumably effective alternative copulatory device, and these two events obviously must have been simultaneous, otherwise immediate extinction of the species would have occurred.

How could the loss of gonopods have been accomplished? From existing species in structurally primitive orders of Diplopoda, we can postulate their original mode of formation from normal walking legs, which have become progressively less leg-like. There is no evidence, nor any reason to believe, that this general evolutionary tendency has at any time been reversed, and it seems particularly unlikely that such a tendency would produce only a single existing species of milliped which is otherwise very similar to another species with fairly normal gonopod structure.

The conclusion to which we are now led is that *Aenigmopus alatus* is the result of a single-step evolutionary change, presumably some kind of macromutation or "saltation." This is a possibility having more than casual interest in the light of a recent statement by Simpson (1953: 104) that there are no known examples—either fossil or recent—of any animal group which *must* have arisen by saltation (by group we infer the meaning of a taxon of generic or higher rank). *Aenigmopus* seems to us to be a generic-level unit which could scarcely have arisen by any other means.

This form of morphological departure from the normal is of course of considerable systematic importance. If the otherwise closely related *Tridontomus* was not known, probably any student of the Diplopoda would have erected a separate suborder of the Polydesmida for *Aenigmopus*. As it is, we feel that the totality of structural features compels inclusion of the two genera in a single family, although there is no doubt about the validity of the two genera. Even females can be readily separated by a number of significant features, a good generic criterion within this class of arthropods!

Since our knowledge of this mutative change is derived entirely from preserved specimens belonging to a group which is still very poorly known from a taxonomic standpoint, we do not care to take a more positive position than to state the facts as we know them, and to indicate the explanation which to us seems most feasible. Obviously the matter is far from being closed; we recognize in particular the need for additional field work to determine if *Aenigmopus* still exists in Guatemala (although it seems totally improbable that Cook discovered examples of a "species" which became extinct in its first generation). Studies on the mating behavior of both species should be of the utmost interest, particularly as regards *A. alatus*, to determine if the enlarged 2nd legs are sperm transfer organs or if seminal material is introduced directly

into the cyphopods from the prolonged coxal process of the males and the enlarged distal articles serve merely as claspers.

Another novel character of the family Tridontomidae is the location of the ozopores on the lower surface of the paranota instead of the upper surface as almost invariably is the case in polydesmoids. Since this ventral position is found in both species of the family, the transfer could have taken place either gradually or as a sharp mutative shift in a common ancestor of the two, rather than concurrently connected with the major mutation involving loss of gonopods in *Aenigmopus,* as might have been thought possible had not *Tridontomus* been available for comparison.

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